PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

PLANTERS' BULLETIN FIFTY-FIVE

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Price
50 Cents

July
1961

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29 AUG 1961

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EXPERIMENT STATION AND FACTORY. This station of the RRI is situated 16 miles from Kuala Lumpur, at Sungei Buloh on the Kuala Lumpur — Kepong — Kuala Selangor road. Visits may be made on Mondays or Wednesdays by arrangement. There is a guest house.

CORRESPONDENCE. All LETTERS must be addressed to the Director, Rubber Research Institute of Malaya, Post Office Box 150, Kuala Lumpur. Special enquiries may be marked for the attention of particular officers. The address for TELEGRAMS is Searching, Kuala Lumpur. TELEPHONE: Kuala Lumpur 72051. PARCELS occasionally arrive without any indication of their origin. Senders' names and addresses should be written clearly on the outside of all packages, and advice of despatch should be given by letter or telegram.

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ADVICE. Enquiries are invited from rubber producers in the Federation of Malaya, Singapore, Nigeria, the colony of North Borneo, and the territories of Sarawak and Brunei, who may require more detailed information applicable to their own special problems. Where it is considered necessary, visits will be made to estates in Malaya as convenient. Visits to estates in other territories are by special arrangement. The only visits for which charges are normally made are those of our clone indentification inspectors. INTERVIEWS should be arranged by letter, as members of the senior research and advisory staff are frequently absent on visits to plantations.

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PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

Kuala Lumpur July 1961 Number 55

Editorial: Chemical Advisory Service

A previous editorial in 1956 was devoted to the Advisory Service provided by our Chemical Division. Since that time, competition with natural rubber from various kinds of synthetic rubbers, including 1:4 cis-polyisoprene, a stereo regular polymer having all the essential characteristics of natural rubber, has increased considerably. The ever increasing availability of general purpose SBR synthetic rubbers and of the new stereo rubbers will probably limit the price fluctuation of natural rubber around a level below the average for the last few years and may require the production and sale of natural rubbers tailored or prepared to suit the needs of individual manufacturers more adequately.

The rubber goods manufacturer of to-day is offered synthetic rubbers in hundreds of variations together with technical advice on how to make improved products from them. To meet this situation, Technical Advisory Services to the consumer on natural rubber problems are now operating in the U.S.A., Great Britain, South Africa, Australia, New Zealand, Malaya, India, Pakistan, Hong Kong and other countries. These services are passing an ever increasing number of enquiries from consumers to the Chemical Advisory Service in Malaya. At present these enquiries are often in the form of technical complaints concerning deliveries of natural rubber. Discoloured crepe, beroti and baling box splinters in RSS 1 packed bare back and in paper bags, excessive bale coatings which fail to disperse, rubbers which smell, cure too fast or too slowly, and many others have all been reported. The Chemical Advisory Service is usually successful in tracing the origin of the rubbers and discovering the cause of the defect. Usually rectification is easily achieved. Where necessary, general recommendations are issued to all estates and factories. Thus, the experience of the Technical Advisory Services to consumers is channelled back, to the advantage of producers, through the Chemical Advisory Service.

Another aspect of the liaison between Technical Advisory Services and Chemical Advisory Service which benefits both consumers and producers, is concerned with special rubbers. Extra clean RSS 1, relatively quick curing crepes, rubber suitable for low water absorption purposes and high hardness rubbers are a few examples of these. From the Advisory Officers' knowledge of the processing methods in various producing factories they are often able to help in arranging supplies, usually through the normal trade channels. The Chemical

Advisory Service sometimes suggests changes in processing conditions to enable producers to make the desired rubbers. Specific tests are carried out on many grades of rubber to ensure that the manufacturer obtains the rubber he requires. If producers receive requests for 'special rubbers' which they cannot supply, they are advised to pass the request on to the Institute. The Service may then be able to advice the producer on how to change their processing conditions to suit, or try to find another source of the 'special rubber' that is required. It is apparent that if not to-day, then tomorrow certainly, an unsatisfied customer is a customer lost to natural rubber.

The two advisory officers of the Chemical Division maintain constant contact with the Technical Advisory Service so as to keep up to date with the requirements of manufacturers. Many joint visits have been made to consumers in Great Britain, U.S.A., Australia and Malaya over the last two years.

The primary occupation of the Chemical Advisory Service is not fully appreciated and estate owners, planters and executives are not always aware of the extent of the Service. This Service covers all types of problems from the time the latex leaves the tree until it is used in the manufacturer's factory. Apart from help given to our Smallholders' Advisory Service, whenever processing problems arise concerning smallholders, direct advice is given to all estate producers with acreages over a nominal 100 acres. It is the producers with the 100 — 1,000 acre units who are least aware of the service rendered. The limited staff available prevents active canvassing for work. Nevertheless, the Institute welcomes any and every enquiry from whichever section of the industry it arises. Advice is given, without charge, by correspondence or visit. The only charges made are for samples submitted for test on a routine basis or for commercial purposes. Samples tested at the request of an Advisory Officer to solve specific problems are examined free.

The Chemical Division Advisory Service is in the charge of Mr J.E. Morris and all enquiries are routed through him. In 1960 he was joined by Mr D. J. Graham who for seven years was resident Chemical Engineer and Factory Technologist at the R.R.I. Experiment Station. Together, with their broad knowledge of rubber production, processing, testing and manufacture, these officers are able to solve the producers' and consumers' problems. The Advisory Officers are also in continual touch with research officers in the Institute and with technical advisory officers here and overseas with whom they can consult on specialised subjects before giving a considered reply.

In advisory work it is most important to distinguish between theory and established fact. It is the Advisory Officers' task to extract definite advice for the planter from the reported work of the Institute. They try to adopt a cautious attitude towards theories wherever they originate. The danger is that without proof from statistically designed experi-

ments it is impossible to take into account the applicability and cost on other sites and the many interacting factors including the personal and subjective observations of the theorist. In some cases advice must be founded on opinion based on the wide experience of the Advisory Officers but in such cases it must be remembered that this advice is limited only to the particular problem in hand and should not be applied to apparently similar problems elsewhere without further reference to the original authority. Another important aspect of the Advisory Officer's task is to note problems and new ideas arising on estates and in factories and, if necessary, to recommend that they be investigated by research officers at the Institute. Ideas on all aspects of processing and presentation of natural rubber are welcome from planters and all those associated with production, since from these ideas, suitably developed, may be obtained information of benefit to the industry.

The Advisory Officers ensure that research findings have been passed through practical trial before they are recommended for use in estate or factory in the ways listed above. The Institute earnestly requests you to help us by addressing all written enquiries to the Director marked for attention of the Head of Chemical Division, and by ensuring that telephone calls and personal visits are made either to the Head of the Chemical Division, to Mr J.E. Morris or Mr D.J. Graham (in their absence Mr G.W. Drake). The Advisory Officers are always pleased to welcome visitors to the Institute to discuss problems, but please telephone to make an appointment in advance. This will prevent the possibility of a wasted journey should the officer concerned be away on tour. Visits are made to all parts of Malaya as enquiries necessitate. As far as possible, visits are made every alternate month to North and South Malaya respectively, with visits to East and Central Malaya as required. The Institute asks for indulgence if visits to you are sometimes delayed, since in planning tours the itinerary must be adjusted to utilise the Advisory Officers' available time to the maximum.

Pollarding and Pruning in Mature Stands of Clone RRIM 501

WIND DAMAGE TO RRIM 501 and other planting material was discussed at some length in *Planters' Bulletin 43* (July 1959). The passage of time has, in general, confirmed the wide-spread and disastrous susceptibility of this clone in plantings which have been opened at 18 or 20 inches girth and tapped for several years. A few areas are known where no wind damage has occurred after five or more years of tapping; this apparent resistance seems to be associated with a relatively high rate

of girthing and a light crown development. In the majority of mature plantings, however, it appears that a state of unbalance develops between crown and trunk which results in increasingly severe reaction to wind and leads eventually to trunksnap. Pruning is the quickest and most effective means of correcting this unbalanced condition. It should be pointed out that there is good evidence to suggest that this condition can be largely avoided by delaying tapping until an average girth of 25 inches or more has been attained.

Several experiments have been set up to study the effect of severe pruning, or pollarding, on mature plantings of RRIM 501. The first was started on a coastal estate in February 1959. The trees in four tasks were pollarded at 12 feet from ground level, and subsequently rested from tapping; another two tasks were not pollarded or pruned but were rested from tapping; a further four 'control' tasks were tapped normally. The majority of trees had been in tapping for just over one year when the trees were pollarded. After treatment, these trees were rested until January 1960, when 100 trees in each 'pollarded' plot were taken into tapping for observation. From June 1960, all pollarded trees of adequate size were tapped, and from August 1960, the 'rested' trees (which had an average girth of 28 inches) were also tapped. The most striking and unexpected result of this experiment was the extensive damage to the bark of many of the pollarded trees below the tapping cut (*Figure 1*). This damage was found on over one third of the trees, and appeared in a regular position, being nearly always on the northern side of the trunk and near the spout above the latex cup. The area of bark which died varied considerably from tree to tree, in some cases extending from the lateral roots to the tapping cut or above, in others appearing only as small isolated patches. The damage was found mainly on trees that had been previously tapped, but a few of the untapped trees were also damaged. The dead bark not only allows entry of disease organisms but may reduce considerably the area of bark from which latex flows to the cut on tapping. The smaller dead patches have calloused over by now, but it seems unlikely that the

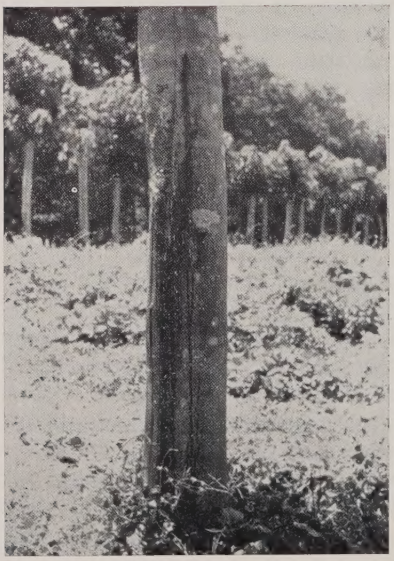

Figure 1. Bark damage found in the original pollarding trial. A strip of dead bark extends from near the tapped region to ground level.

TABLE 1. AVERAGE YIELDS IN POUNDS PER TASK PER TAPPING WITH D.R.C. GIVE AS 'CHEE' MEASUREMENTS

Month (1960)	*Pollarded*			*Control*			*Rested*		
	No. 1	*Scrap*	*Chee*	*No. 1*	*Scrap*	*Chee*	*No. 1*	*Scrap*	*Chee*
June	9.8	2.3	3.0	33.7	4.5	4.0	–	–	–
July	21.0	3.6	3.7	35.3	6.8	4.0	–	–	–
Aug.	21.3	6.0	3.7	34.2	7.2	4.0	32.8	5.6	5.3
Sept.	21.0	7.7	3.6	34.9	8.4	3.9	48.4	10.9	3.9
Oct.	20.2	7.3	3.5	34.8	9.5	4.0	37.7	14.1	3.6
Nov.	19.5	9.2	3.3	34.0	9.0	3.9	35.8	16.9	3.6

larger ones will ever heal completely. The damage to the bark does not seem to have affected the regeneration of the foliage which has now reached a height of 25-30 feet, and looks very regular. In most cases, several branches of approximately equal vigour arise from the top of the old trunk. In the absence of further pruning there is little tendency to form a leader. In the pollarded tasks, it was found that brown bast cases had risen to 8 or 9% at the beginning of 1961 and the whole experimental area was therefore put on to third daily tapping. As can be seen in *Table 1*, the yield of the pollarded trees is considerably below that of the control, and the dry rubber content (given as 'Chee' values) also appears to be slightly below normal.

On another estate, pruning was carried out in November 1959 at about 20 feet from the ground, all leafy branches being removed. In this case, even more extensive bark damage was observed, approximately two thirds of the pruned trees being affected. The damage occurred near the base of the tree on the south-west side, the side which would have received the full force of the early afternoon sun at the time of year (*Figures 2* and *3*). A group of fifty trees had sacks covering the lower part of the trunk and escaped damage. These trees also happened to be those most shaded by neighbouring trees, and this may have been a contributing factor in their freedom from damage.

The above observations suggested that sun-scorch was a major factor in producing the bark damage, and a further trial at the R.R.I. Experiment Station supported this. In April 1960, three treatments were applied in separate plots: pollarding at 12 feet, pruning at 25-30 feet and unpruned as control. Within each plot, four more treatments were applied to individual trees: tapped and covered with newspaper, tapped and not covered, not tapped but covered with newspaper, and neither tapped nor covered (*Figures 4* and *5*). The paper covering extended roughly from the stock/scion union to a height of 5 feet. After several months, bark damage was observed on both pruned and pollarded trees. On this occasion, most of the damage occurred on lateral roots and

Figure 2 and 3. Bark damage on pruned trees, with dead bark removed. Note position of damage over stock/scion union, and on exposed lateral root. Note also developing callus at edge of damaged area.

on the stocks. In no case was bark damage found under the newspaper covering, although on numerous non-covered trees, some damage was noted on corresponding regions of the trunk. Since the paper covering did not extend over the stock, damage occurred in this zone on both papered and non-covered trees. This provides evidence that excessive exposure to sunlight following the removal of foliage is the main causative agent of this bark dieback.

Girth measurements for tappable trees in this experiment are given in *Table 2*. It will seen that, during the first year of the experiment, the unpruned rested (control) trees have

TABLE 2. AVERAGE GIRTH IN INCHES

	Tapped				*Not tapped*			
	Apr. 60	*Oct. 60*	*Apr. 61*	*Annual increment*	*Apr. 60*	*Oct. 60*	*Apr. 61*	*Annual increment*
Pollarded*	22.3	22.4	22.4	0.1	22.4	22.5	22.5	0.1
Pruned*	22.4	22.6	22.7	0.3	22.5	22.8	23.2	0.7
Control	23.0	23.9	24.1	1.1	23.0	24.9	26.2	3.2

* Pruning and pollarding carried out in April 1960

Figure 4. RRIM 501 at the Experiment Station two months after pollarding at 12 feet. Note paper covering on some trunks.

girthed most vigorously, and that the pollarded trees have girthed very little as expected. The pruned trees girth somewhat faster than the pollarded trees, but, nevertheless, considerably more slowly than the control. Resting from tapping has enhanced the growth rate of control and pruned trees, but not of the pollarded.

It will be seen in *Table 3* that after pruning or pollarding the yield declined for the first three or four months but then began to rise slowly again. The pruned trees have now (May) established reasonably dense crowns and the yields are expected to improve fairly steadily. The pollarded trees of which the crown regeneration is very slow, will obviously take a long time to regain a normal yield level, if they ever do so.

A further experiment was started in October 1960 to see if an easier method than 'papering' could prevent sun-scorch. Three treatments: pruning at 25 feet, pruning half the main branches, and no pruning, were set out in main plots of about 60 trees, while within each plot there were six

Figure 5. RRIM 501 at the Experiment Station two months after pruning at about 30 feet. Compare canopy regeneration with that of pollarded trees in Figure 4.

TABLE 3. AVERAGE YIELDS PER TREE PER TAPPING

	Control grams	*As % of control*	
		Pruned	*Pollarded*
May	24.9	73	50
June	20.1	53	57
July	25.4	37	27
Aug.	34.9	39	14
Sept.	33.7	56	14
Oct.	25.4	85	29
Nov.	40.0	60	25
Dec.	41.1	67	34
Jan.	55.8	61	36

treatments randomised amongest individual trees:

Tapped { paper covered / white-washed / not covered } Not tapped { paper covered / white-washed / not covered }

After six months, there has been very little bark damage in any treatment, presumably because of the cloudy, wet weather conditions for the two or three months after pruning. In the pruned plots, a number of trees have their exposed lateral roots scorched on the upper surface, but this appears to be the only damage. The canopy has regenerated very quickly and it seems most unlikely that there is any further damage to be expected. The effectiveness of whitewash in preventing sun-scorch is therefore not proved, but some interesting temperature measurements were made which have a bearing on this. The temperature of the bark near the cambium was measured on a number of trees, by inserting a needle thermocouple into the bark to a standard depth. Measurements were taken on both the sunny and shady sides of trees in all treatments. It is apparent from *Table 4* that both whitewash and paper coverings considerably reduce the bark temperature. We assume that the temperature recorded on the sunny side of non-covered trees (46.2°C) must be near the level at which cambial cells would be killed. On a sunny day, the temperature difference between a whitewashed and a bare trunk is quite noticeable to the touch. The main disadvantage of whitewash is that it does not last long in wet weather; several applications may be needed before sufficient shade is cast by the regenerating crown

TABLE 4. BARK TEMPERATURES OF PRUNED TREES (°C)

	Not covered	*Papered*	*Whitewashed*
Sunny side	46.2	39.5	36.8
Shaded side	34.3	32.8	33.0

TABLE 5. AVERAGE GIRTHS IN INCHES

	Tapped			*Not tapped*		
	Sept. 60	*Mar. 61*	*6 months increment*	*Sept. 60*	*Mar. 61*	*6 months increment*
Pruned*	22.6	22.8	0.2	22.4	22.6	0.2
Part pruned*	22.8	23.1	0.3	22.6	23.6	1.0
Control	22.7	23.2	0.5	22.8	24.4	1.6

* Pruning carried out in September 1960.

to make further direct protection of the trunk unnecessary.

The partially pruned trees had about half of their main branches cut off (*Figure 6*) and it is intended that further pruning will be carried out in stages. It is possible that by this type of 'progressive' pruning a better yield may be maintained and sun-scorch avoided. *Table 5* gives girth figures for the various treatments, and *Table 6* presents figures for mean yields per tree. As expected, the not-tapped control trees have the biggest girth increments and the tapped pruned trees have the smallest. The girths and yields of the partially pruned trees are intermediate between the control and completely pruned trees. Over this short period of six months, it appears that, relative to the control, the girth increment of the partially pruned trees has fallen rather more than has the yield. It will be interesting to see if this is confirmed by the next series of measurements.

Readers may wonder why no mention has been made of the effectiveness of pruning and pollarding in avoiding wind damage, since that is the purpose of the operation. The answer is that there has been very little wind damage in the areas used. The trees used in the experiments had, in general, been in tapping for only a short time (a year or so) when the treatments were applied, and wind damage in the control plots is not likely to be severe even

Figure 6. Partially pruned trees in 'progressive' pruning experiment.

TABLE 6. AVERAGE YIELDS PER TREE PER TAPPING

	Control grams	*As % of control*	
		Part pruned	*Pruned*
Oct.	28.4	81	106
Nov.	40.4	85	73
Dec.	39.6	92	44
Jan.	51.4	81	28

now. The question of whether the pruned and pollarded trees will eventually become susceptible cannot be answered for several years. It would seem that the higher and the lighter the pruning operations have been, the more likely this is to occur. Pollarding at 12 feet seems unnecessarily severe, while pruning at 35-40 feet may not be effective.

In practice, with trees in a dangerous state of susceptibility to wind damage, it is suggested that pruning at about 25 feet from the ground should be reasonably effective. In order to promote the subsequent formation of a balanced crown, it is advised that within any one tree the height of cutting should be staggered, so that, if the main branch is cut off at 26 feet, the second should be at 24 feet, the third at 22 feet, and so on. Small branches already growing low on the stem should be left on the tree to aid in shading the trunk, and to help regeneration. Ideally the pruning should be done by clean saw cuts at an acute angle, and the surface of the larger stumps painted with asphalt-kerosene mixture, with a top coat of whitewash. In any case, it seems advisable to protect the trunk directly with paper, whitewash, or perhaps large jungle leaves; covering is needed especially towards the base of the trees on the side receiving the late morning or early afternoon sun. Exposed lateral roots should be covered with soil or a well-rotted mulch of some sort. By pruning in the 'wet' season, October — December, the tendency to sun-scorch may be reduced, but it seems likely that a single clear sunny day would be sufficient to cause the damage. A protective covering should therefore be put on at the same time as, or before pruning; not several days later. It may be worth noting that the damage frequently occurs on the seedling stock material, and cannot therefore be regarded as a peculiarity of RRIM 501. Severe pruning of mature trees of other clones may, therefore, result in similar bark damage, and similar precautions are advised.

If whitewash is used, it should be made up thickly, and perhaps stiffened with a little starch. Several coats may be needed at intervals of a few weeks. After pruning, it is advisable to rest the trees for six months or so, and then go on to a periodic tapping system, such as S/2.d/2.6m/9.67%, as mentioned in the correspondence columns of *Planters' Bulletin 54*. This should permit a reasonable rate of girthing

and also produce a worthwhile yield. Severely pruned trees seem to be rather susceptible to brown bast, and periodic tapping should also help to counteract this tendency.

It will be obvious from the above, that severe pruning and pollarding are not to be undertaken lightly. The actual cost of the work may be considerable (in the order of 40 to 60 cents per tree), while increased weeding costs, loss of crop, and increased susceptibility to brown bast, all add to the original outlay. It should be emphasised, then, that severe pruning is recommended only as an emergency measure, for trees which are already in a markedly unstable condition. As a general policy, to avoid this unbalanced state in young plantings of RRIM 501, it is suggested that:

a. tapping be postponed until an average girth of 25 inches has been attained
b. a periodic tapping system be used
c. nitrogen applications be reduced after the trees reach tappable size.

The first recommendation is based on the behaviour of this clone in the pre-war 500 series trial, where, owing to delay caused by the Japanese occupation, the trees were opened for tapping at an average girth of 25 inches or more; RRIM 501 did not suffer appreciable wind damage in these trials, and is still yielding very highly. The second recommendation is based on the estate observations reported in *Planters' Bulletin 54*, while the third recommendation is based mainly on the general observation that a high level of nitrogenous fertiliser results in heavy crown development.

Whether it would be strictly necessary to use all three procedures on any one planting, or whether, by use of a periodic tapping system, one will be able to safely open at less than 25 inches girth, are questions which cannot be answered with certainty. Until we have more definite information on the subject it seems advisable to be as cautious as possible, and take the maximum preventive measures.

Depth of Bark Scraping Before the Application of Yield Stimulants

EXPERIMENTS CARRIED OUT before the Japanese occupation showed that significant yield increases could be induced by scraping away the outermost layers of bark below the tapping cut, until minute beads of latex appeared, and painting the scraped surface with red palm oil. However, it was also found that deeper scraping, resulting in profuse latex bleeding, was harmful. When work on yield stimulation was resumed in Malaya after the war, the same scraping method was found to be successful for the application of the new yield stimulant mixtures which

Figure 1. The scraping methods employed.

were then being developed, and this is still the basis of the Institute's recommended procedure for the application of 2,4,5-T and Stimulex.

A new experiment has recently been carried out with the object of investigating whether it was in fact necessary to scrape to the recommended depth, or whether lighter scraping could be employed without loss of yield increase. It was decided to carry out this first experiment on trees tapped on high panels in virgin bark, for two reasons; first, it is on thick virgin bark that scraping becomes most tedious and expensive and second, as the anatomical features on virgin bark are easily recognised, it was comparatively simple to scrape to specified depths.

A field at the R.R.I. Experiment Station containing an old small-scale clone trial, budded in 1930, was selected for the purpose. The trees had been opened on the first high panel, at 110 inches from the union, some six months before treatments were applied and were tapped V/2.d/2.100%. A tree-plot design was employed with 46 replications. Three depths of scraping were compared:

Method A — Very light scraping of a three-inch band of bark below the tapping cut, removing only the outermost corky

layers and revealing a greenish layer of collenchyma cells containing chlorophyll.

Method B — Scraping through the green collenchyma layer up to, but not through, a whitish layer of hard tissue (the sclerenchyma ring).

Method C — The scraping was continued through the sclerenchyma ring into a coarse pinkish tissue. This corresponded with the procedure recommended by the Institute. Over-scraping, resulting in latex bleeding, was avoided.

These three depths of scraping are illustrated in *Figure 1*.

Three mixtures were applied to the scraped bark: Stimulex, the standard R.R.I.M. formulation of 2,4,5-T, and the palm oil/petrolatum carrier without 2,4,5-T. Ready Rub, applied to a three-inch band below the cut without any scraping, was also included for comparison, as was an untreated control.

The mean yields in grams/tree/tapping for six months following treatment are shown in *Table 1*. The trees scraped and treated with only the carrier show small gains in yield. All the Stimulex and 2,4,5-T treatments show substantial yield increases and there are no significant differences between the three depths of scraping. The R.R.I.M. 2,4,5-T mixture consistently out-yielded Stimulex, the difference being statistically significant in the case of scraping method A. Ready Rub occupies a position intermediate between the other two stimulants.

Figure 2 shows the monthly yield trend of some of the treatments. The effects of the different depths of scraping are very similar for both 2,4,5-T and Stimulex. The deeper scraping method C resulted in higher peak yields during the first two months but this was followed by a

TABLE 1. MEAN YIELDS FOR SIX MONTHS AFTER TREATMENT IN GRAMS/TREE/TAPPING

Mixture Applied	*Scraping Method*		
	A	*B*	*C*
Stimulex	51.9	51.7	52.2
2,4,5-T	60.0	56.3	59.3
Carrier only	41.0	44.9	43.6
Ready Rub, no scraping		54.2	
Control, no treatment		38.1	
5% significant difference		7.4	

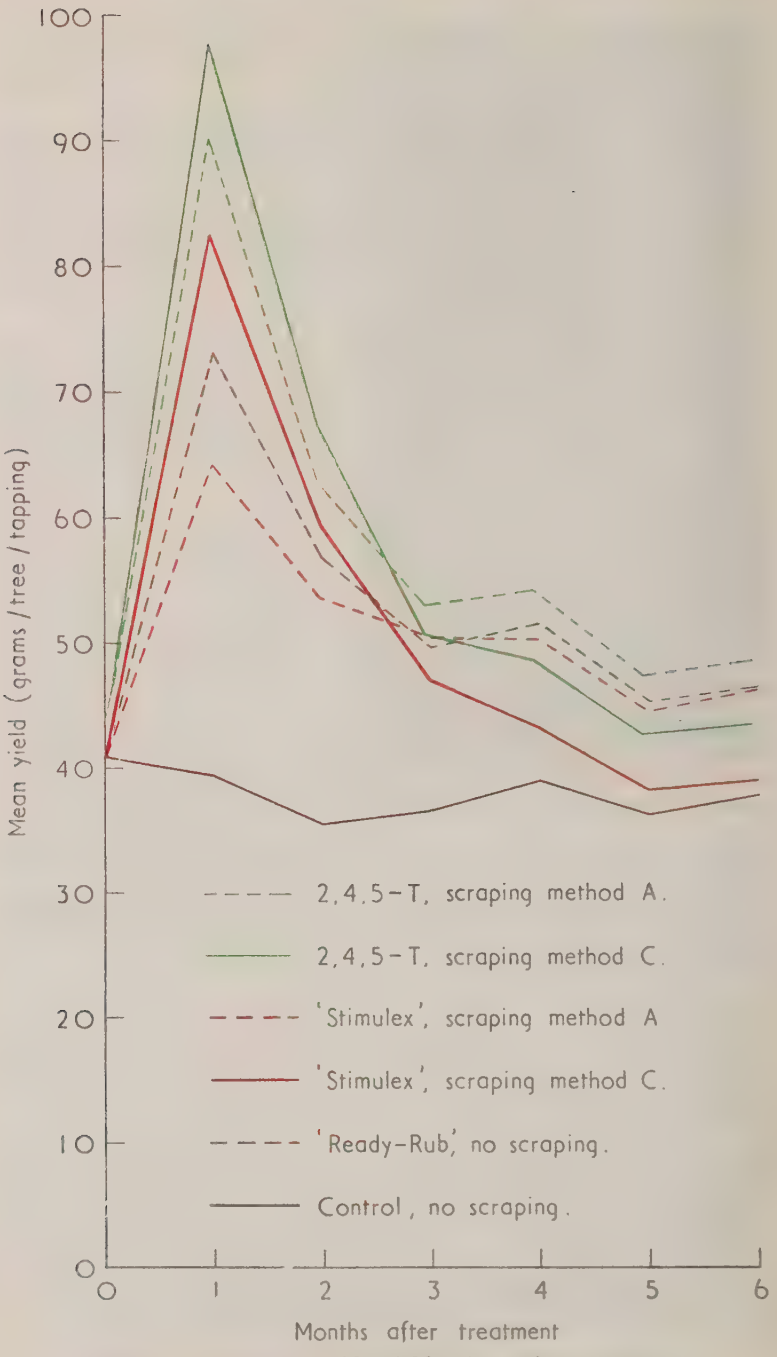

Figure 2. Mean monthly yields of certain treatments.

comparatively rapid decline in yield to a level little above that of the control. The very light scraping method A, on the other hand, gave a lower peak yield, but the decline was less rapid, so that its yield exceeded that of method C during the last four months. Ready Rub again occupies an intermediate position.

It would thus appear that, under the conditions of the present experiment, nothing was gained by scraping any deeper than the very light method A. Indeed, this light scraping not only resulted in equally large overall yield increases, but gave a rather more desirable yield trend, reducing the peak yields immediately following treatment (when there is often excessive late dripping) and spreading the increase more evenly over the whole six-month period.

It might be asked, in view of these results, whether any scraping is required at all, but, in fact, earlier experiments clearly showed that only slight yield increases resulted when stimulants were applied to unscraped bark. It appears that the outermost corky layers form the most important barrier to the entry of the yield stimulant. Only when special penetrating formulations, such as Ready Rub, are used can scraping be dispensed with entirely. In this experiment, Ready Rub has given good stimulation on virgin bark, as it did in the estate trial reported in *Planters' Bulletin 51*, but the results from its use on renewed bark have been less satisfactory. In both the present experiment and the estate trial referred to, it was noted that the Ready Rub has a tendency to spread downwards and cause swelling and cracking of the bark below the treated band. For this reason it is recommended that Ready Rub be applied to only a two-inch strip below the cut on trees tapped alternate daily. No damage was observed in the trees treated with the other mixtures.

TABLE 2. COST OF YIELD STIMULATION

Treatment	*No. of trees treated*	*No. of man-days required for*		*Quantity of stimulant used, lb*	*Cost per acre in $*		
		scraping	*painting*		*labour*	*material*	*total*
Flomore	1531	29*	8	32	5.88	1.10	6.89
Stimulex (below cut)	1496	28*	8	31	5.73	1.38	7.11
Ready Rub	1506	nil	10	48	1.59	2.92	4.51
Stimulex (above cut), alternate monthly	1392	nil	6×3 =18	10 × 3 = 30	2.82	1.32	4.14

* The slight difference between these two figures is due to the fact that the first stimulant to be used, in the short period when the workers were still acquiring proficiency in the method of application, was Flomore.

The present experiment was very carefully supervised to ensure that the different treatments received exactly the desired depth of scraping. It was thus not possible to form any estimate of the costs of the different scraping methods in commercial practice. *Table 2* which is reproduced from page 117 of *Planters' Bulletin 51*, compares the costs of yield stimulants applied by usual methods. It is evident that a considerable saving in the costs of applying Stimulex and the R.R.I.M. 2,4,5-T stimulant below the cut would be effected by adopting the very light scraping Method A, and that the economic attractions of using the methods of stimulation which do not require scraping would be comparatively reduced.

Further experiments are now being started to confirm the main results of this experiment and to investigate the relationship between frequency of application of the yield stimulant and optimum depth of scraping. The question of depth of scraping in renewed bark is also under investigation. We will be in a position to make firm recommendations only when the results of these experiments are available. In the meantime we thought that readers would wish to know the results obtained so far. A note of caution must, however, be given. The present observations were made on trees tapped on good virgin bark. In the case of hard bark deeper scraping may be found desirable. Again, no information is yet avilable on renewed bark and, since the quality of renewed bark varies appreciably, it may be difficult to make generalisations in this case. Until we are in a position to make a more definite recommendation, we suggest that the planter should continue to follow the existing practice of scraping renewed bark until the red layer is reached, avoiding excessive latex bleeding. He may feel justified in trying a more shallow scraping method on virgin bark although he may prefer to continue to employ method C, described above.

Reorganisation of Rubber Research

We have pleasure in presenting a guest article by Sir Geoffrey Clay, K.C.M.G., O.B.E., M.C., *Controller of Rubber Research and Chairman of the Malayan Rubber Fund Board.*

IN HIS ADDRESS AT THE CLOSING SESSION of the Natural Rubber Research Conference, the Controller of Rubber Research, Sir Geoffrey Clay, having reviewed the scope and contents of the papers and discussions, devoted the rest of his address to a brief outline of the progress in reorganisation of the research and development bodies under the control of the Malayan Rubber Fund Board. These bodies are: the Natural Rubber Producers' Research Association (formerly the B.R.P.R.A.), the Rubber Technical Developments Ltd, the Natural Rubber Bureau (formerly the N.R.D.B.)—all in the United Kingdom (see *Planters' Bulletin 12*) and the Rubber Research Institute of

Malaya. The Editor of *Planters' Bulletin* feels that readers would be interested to learn about the changes which are taking place in the organisation and control of research.

MALAYAN RUBBER FUND BOARD

In 1958 the Malayan Rubber Fund (Research and Development) Ordinance established a Malayan Rubber Fund Board comprising five members appointed by the Rubber Producers' Council, two members appointed by the Minister of Commerce and Industry in consultation with the R.P.C., two other members appointed by the Minister, and the Chairman who is ex officio the Controller of Rubber Research, making a total membership of ten. The members are representative of or associated with the rubber producers of the Federation — smallholders, small proprietary estates and the large, well-capitalised company estates. This is important because the industry provides the finance which, through the cess on rubber exported from the Federation, is paid into the Malayan Rubber Fund; it seems right that the producers should have a large measure of control over expenditure of these funds, subject to the overriding powers reserved for the Minister to issue policy directives to the Board.

The principles underlying the reorganisation of the bodies financed by the Malayan Rubber Fund are as follows:

1. Sole powers for the overall policy on research, the programmes and policies of the various units, and the allocation of finances from the Malayan Rubber Fund to those units, should be concentrated in the Malayan Rubber Fund Board.
2. Directors of the units must be relieved of the routine administration and business affairs which inevitably arise in organisations as large as the R.R.I.M. and N.R.P.R.A. (These between them have budgets totalling more than ten-and-a-half million dollars for 1961).
3. The Directors of Research at the N.R.P.R.A. and the R.R.I.M. should be provided with high-level consultants. This is a continuation of the existing principle that the Directors of Research have access to the best scientific advice in the development of their research programmes.
4. The non-technical, day-to-day management of the individual units in the United Kingdom — the N.R.P.R.A., the R.T.D. Ltd, and the N.R.B. — must be well integrated.
5. For research on the crop up to the stage of shipment from Malaya, work carried out at the R.R.I.M. should be co-ordinated as far as possible with that of the research units maintained by some of the leading planting companies.
6. The programmes of research and the development projects should be in proper balance and integrated where necessary.

7. The results of research are to be disseminated to the producers or the users for their adoption where they have been proved economic.
8. The complaints and advice of producers or users of the natural rubber product of Malaya must be obtained.

These then are the principles which have influenced the reorganisation. Their application, in the policies now agreed upon by Government and the Rubber Producers' Council, will be examined in the remainder of this article.

MEMBERSHIP OF BOARDS

In order to achieve control in the hands of the M.R.F.B. (see first principle above) and to facilitate the integration of the management of the units concerned (fourth principle), the Memoranda and Articles of Association of the three units in the United Kingdom (the N.R.P.R.A., the R.T.D. Ltd, and the N.R.B.) have been so revised that the five members of the Boards are appointed by the Minister of Commerce and Industry on the recommendations of the Malayan Rubber Fund Board, or by the M.R.F.B. itself. These reconstituted Boards in the United Kingdom have been given a common membership; each has as its Chairman the Controller of Rubber Research (Sir Geoffrey Clay), and as its Vice-Chairman and Executive the London Representative of the M.R.F.B. (Mr E. Jago, see below); each also consists of the Director of Research of the N.R.P.R.A. (Dr L. Bateman), and two businessmen (Mr H.R. Egmont Hake and Mr E.D. Shearn) as nominees of the Rubber Producers' Council. The businessmen with their long experience in Malaya and their intimate knowledge of the plantation industry, are invaluable on the business side of the management of these units.

The Boards of the N.R.P.R.A., R.T.D. Ltd and N.R.B. (though less, possibly, in the case of the last-named), may not discuss research matters or development projects. Their only connection with the research programme is the duty of ensuring that the expenditure of funds allocated for approved programmes shall not be exceeded.

A new post of London Representative of the M.R.F.B. has been established. Mr E. Jago, O.B.E. has been appointed to this post, on the understanding that as soon as possible it will be occupied by a Federation citizen. Mr Jago has for many years been associated with the interests in London of natural rubber producers, particularly as Deputy Chairman and Executive Officer of the N.R.D.B. When that body became the N.R.B., Mr Jago was made Vice-Chairman. In addition to retaining this position, his main function will be to co-ordinate the executive work in the United Kingdom. He will also be in charge of the management side of the Technical Advisory Services (see below) for manufacturers in various parts of the world.

In the case of the R.R.I.M., there is some delay in reconstitution, involving as it does the enactment of new legislation. It has been agreed however that the Board of the R.R.I.M. should be dissolved and replaced by a Management Committee of the R.R.I.M. This would be an executive body concerned with day-to-day business and administrative problems. The present Board of the R.R.I.M. is employing an Organisation and Methods expert to make a survey of the administration of the R.R.I.M. and its Experiment Station at Sungei Buloh. Until the report from this expert has been received and studied, it is not possible to define exactly the future set-up in the Headquarters of the Institute.

As indicated above in the fifth and eighth principles, there should be appropriate means of taking into consideration the advice of producers when planning the research programme of the R.R.I.M.; the work of the Institution must be co-ordinated as far as possible with that of the research units maintained by leading companies. It is felt that this might be done by an annual meeting of the Director of the R.R.I.M. and his staff together with selected representatives nominated by the individual plantation companies from their research staffs. It is important that in the build-up of the R.R.I.M's programme of research, the views and wishes of the large-scale plantation companies should be fully considered. There will however be no question of arbitrary allocation, between the R.R.I.M. and the other individual research units, of the actual items which should be carried out by each party. It is hoped that where agreement is reached on a co-operative research programme on specific items, such a programme can be defined by a working committee set up by the Director of the R.R.I.M. This has already happened with experiments to test out the validity, under Malayan conditions, of the physiological diagnosis technique which has been evolved by M. Beaufils as a member of the Institute des Recherches sur le Caoutchouc au Vietnam. (An account of this co-operative research project can be found in *Planters' Bulletin 51*).

It has also been agreed that the Estates Advisory Service of the R.R.I.M. should organise an annual Planters' Conference for estate managers and advisors, to discuss selected estate problems. Experienced members of the planting industry will be invited to open the discussions on one particular item each, and Heads of Divisions of the R.R.I.M. will take part in the discussions. The two-way traffic of ideas (eighth principle) is particularly desirable for research on the crop; hence much importance is attached to this Planters' Conference. The first of these Conferences will be held on July 28/29th, 1961.

The Estates Advisory Service, under its new head, Mr F.W. Hutchison, is to concentrate on developing its contacts with the owners of small estates (from 100 to 1,000 acres). It is assumed that properties running to three, four or five thousand acres, will either have

their own company research organisations or will make known their wishes and queries to the Estates Advisory Service. A recent review of the small estates indicated that there is a need for close attention in advisory work to these particular units.

In addition to consultation with producers, the Director will select a number of consultants in the United Kingdom or elsewhere (preferably in agreement with the Director of the R.R.I. of Ceylon). He (and his divisional heads) will seek advice from these experts on the latest developments in particular spheres of research, before he submits his programme of research to the Malayan Rubber Fund Board through the Co-ordinating Advisory Committee in London.

RESEARCH ON THE PRODUCT

The N.R.P.R.A. and the R.T.D. Ltd are to be merged gradually into one body under the Research Director of the N.R.P.R.A. (Dr Bateman). This is to ensure that the N.R.P.R.A. Director has full control over operations of the R.T.D. Ltd and trials of new rubbers or new processes. Under the new headquarters organisation (at Welwyn Garden City, England) of the combined N.R.P.R.A. and the R.T.D. Ltd, Dr Bateman has promoted Dr L. Mullins to the post of Deputy Director and has strengthened the administration of the Technical Advisory Service and liaison (described below) by appointing as its head Dr G.F. Bloomfield. The M.R.F.B. has agreed that when it is considered necessary there may be appointed a second Deputy.

Under the old Articles of Association, the Board of the N.R.P.R.A. comprised not only representatives nominated by the Secretary of State for the Colonies in the United Kingdom but also eminent scientists (whose time at Board meetings was largely taken up with report reading and discussing administrative and business matters). The scientific scrutiny of the proposed programme of research is now assured by the appointment of consultants to the Director (see third principle). Particular points in his proposed programme can be discussed with experts in these individual branches of research.

Dr Bateman has recently selected five eminent scientists in the field of rubber science and technology as consultants. The reorganisation carried out so far will enable Dr Bateman to take a more active part in the chemical research for which he is particularly qualified. It will also give him more time to travel and keep in touch with the rubber manufacturing industry, particularly in the United States, and with the research being carried out at associated organisations such as the Institut Francais du Caoutchouc in Paris, the Research Association of British Rubber Manufacturers, and the scientific committee of the Federation of British and Allied Rubber Manufacturers.

CO-ORDINATING ADVISORY COMMITTEE

The overall review of the research programme and its developments, for both the R.R.I.M. and the N.R.P.R.A., will be the main function

of the Co-ordinating Advisory Committee which has been set up in London, under the Chairmanship of the Controller of Rubber Research. This is the central advisory body which ensures that the research programmes and development projects are properly balanced and integrated (sixth principle) — one of the most important factors in the wise spending of M.R.F.B. revenue.

The Malayan rubber industry is fortunate in the composition of this Committee; every invitation to serve on it was accepted. The members are as follows:

Sir Frank Engledow a leading Commonwealth agricultural scientist. (He was Chairman of the 1933 Commission of Enquiry into the Constitution, Administration and Working of the R.R.I.M.).

Mr E. Jago London representative of the M.R.F.B. and Vice-Chairman of the N.R.B.

Sir Harry Melville and Sir Eric Rideal, eminent scientists in polymer and colloid research respectively.

Dr W.E. Cake, Vice-President in charge of the Co-ordination of Research and Development in the United States Rubber Company.

Dr Pierre Michaux, Scientific Advisor to the Oil and Fat Research Institute, Paris, formerly Scientific Advisor to the Socfin Company.

Mr E.A. Murphy, Director of Research in the Dunlop Rubber Company in the United Kingdom.

Dr J.G. Mackay, a scientist formerly associated with the Avon Rubber Company, now Chairman of Francis Shaw & Co., makers of rubber manufacturing machinery.

Messrs H.B. Egmont Hake and E.D. Shearn (see above) nominated by the Rubber Producers Council.

Mr N. Daniel, on the senior staff of the Dunlop Rubber Company (Materials and Supply Division), representing the rubber manufacturers (he recently replaced Mr D.J. Flunder).

Tunku Ja'afar bin al-marhom Tuanku Abdul Rahman, representing the Malayan High Commissioner in the United Kingdom.

Mr R.B. Cary, representing the Ministry of Commerce and Industry.

The Committee is particularly fortunate in having Dr Cake as a member; the United States Rubber Company itself operates in Malaya through the Malayan American Plantations Limited. At the first meeting of the Committee in October 1960, Dr Cake arrived armed with twenty-one points which he and his counterparts in the 'Big Four' American manufacturers (Firestone, Goodrich, Goodyear and United States Rubber Company), considered merited inclusion in the programmes of research for the N.R.P.R.A. and the R.R.I.M. Many of these points were already covered in the research programmes, but it is particularly satisfactory to note that Dr Cake announced the agreement of those manufacturers to try out any new rubbers or processes resulting from

research either in Malaya or at Welwyn, provided they are supplied with a reasonable quantity (say 250 lbs) of the particular product concerned.

The Co-ordinating Advisory Committee advises the M.R.F.B. on the research programmes of the N.R.P.R.A. and the R.R.I.M., on the integration of those programmes and on the relative emphasis to be placed on various components of the research proposals as a whole. It also assesses the economic potentialities of proposals for transfer of research projects to the pilot stage of development. It works through its functional Steering Committees, one for research in the fields of rubber chemistry and technology and the other for agricultural and biological research. These Steering Committees are therefore partly fulfilling a function formerly carried out by the scientific members on the board of the N.R.P.R.A. and on the London Advisory Committee to the R.R.I.M.

At its first formal meeting in October 1960, the Co-ordinating Advisory Committee examined in detail the draft programmes of research and development of the bodies financed by the M.R.F.B. Its report was then considered at a meeting of the Malayan Rubber Fund Board in December and approved. Finances have been allotted on that basis.

It is of interest in connection with a point of principle (seventh above) to note that the Co-ordinating Advisory Committee, in examining the proposals for development, drew attention to the rapidly expanding cost of the R.R.I.M's Smallholders' Advisory Service. The Committee agreed that such an Advisory Service must have sufficient field staff to be able to discuss with the smallholders, individually and collectively, the problems of rubber cultivation. (This is particularly necessary at present when the smallholders' rubber industry is trying to replant regularly a certain proportion of its older trees). But, while accepting the necessity for an adequate and efficient Advisory Service, the Committee felt that some word of warning to the M.R.F.B. might be expedient. It agreed in general that all the expenditure for 1961 should be as stated in the estimates, but for the following two or three years the units financed by the Board should consider this as a maximum total for estimates, unless there were particular reasons for exceeding it.

TECHNICAL ADVISORY SERVICES

For disseminating the results of research (seventh principle) in the case of the product, the M.R.F.B. is particularly interested in the development of Technical Advisory Services amongst rubber manufacturers. These Services are based on the research work carried out in either the N.R.P.R.A. or the Chemical Division of the R.R.I.M. The policy has been to proceed cautiously, but so far the Technical Advisory Service in England is proving of great value, not only to manufacturers but also to the N.R.P.R.A. laboratory staff. Similarly in the United States, the establishment of a modest Technical Advisory Service to manufacturers is proving most profitable. In addition to advice given on speciality

rubbers, such as the Technically Classified Rubbers and the Superior Processing Rubbers (the latest being PA 80), and assistance in meeting compounding difficulties amongst the smaller manufacturers in the United States, there is a flow of ideas through the Technical Advisory Service back to research units (eighth principle). These concern problems which require either purely technical investigation or additional research. One of the difficulties in developing Technical Advisory Services to manufacturers, in the United Kingdom at any rate, is that the staff who are in personal contact with the problems on the factory floor, and are of course technically qualified, become so well-known and so highly thought of that we are in danger of losing them as soon as they become really experienced.

RESULTS EXPECTED FROM REORGANISATION

To sum up, it is anticipated that the following results will flow from the reorganisation, now almost completed, of bodies financed by the M.R.F.B: Firstly, full control of expenditure, research programmes and development policy will rest solely with the M.R.F.B. under the responsible Minister of Commerce and Industry.

Secondly, the Directors of Research both in the N.R.P.R.A. and the R.R.I.M. will have greater responsibility in the framing of their research programmes (with the help of specialist consultants) in that their governing boards will no longer be concerned with research. The research programme of the R.R.I.M. will keep in line with the thinking of research people outside the Institute and with current problems in the planting industry. This will be achieved by the association of the Director and Heads of Divisions with the planting industry, especially the research units of large plantation companies, and by the annual Planters' Conference.

Thirdly the two Directors of Research, freed from routine administration, will have more time to discuss programmes and future developments with their divisional heads. They will be able to travel more, with periodic visits to the U.S.A. to discuss with our staff there the developments in synthetic rubber and the consumption of natural rubber.

Fourthly, through common membership of the Boards of the N.R.P.R.A , the R.T.D. (until it is finally absorbed by the N.R.P.R.A.) and the N.R.B., there will be some form of integration at the management level of these three bodies. The Boards are excluded from control of or responsibility for the research programme of the Directors of Research; they have to ensure however, that expenditure is within the approved budget for any particular year.

Fifthly, at the scientific research level, the research programmes of the two institutions, the R.R.I.M. in Malaya and the N.R.P.R.A. at Welywn, will be co-ordinated where necessary. Priorities in research objectives must be in line with developments within the industry; new proposals from the advisory body in London, as well as proposals from the Directors of Research, will be considered as a whole and

given their proper place in the final approved overall research and development programme submitted to the M.R.F.B.

It is felt that these objectives in scientific co-ordination will be well cared for by the new body. The Co-ordinating Advisory Committee in London will report annually to the Malayan Rubber Fund Board through the Controller of Rubber Research on the programmes and policies which the research and development units are following. It will also give its views on any adjustments needed or on points of emphasis which should be made.

In respect of the 1961 research programmes and Malayan Rubber Fund Board expenditure, it is interesting to recall that out of a total budget of $12,778,000, allocation has been approved, on the recommendation of the Co-ordinating Advisory Committee, of just over 60% of the total expenditure to the R.R.I.M., just over 21% to the N.R.P.R.A. (together with the R.T.D. Ltd) and over 14½% to the N.R.B. (with its activities in publicity, publications, public relations and control of the overseas N.R.B. managers, including expenditure in the United States). The other essential but minor items take just under 3% of the total expenditure. The Co-ordinating Advisory Committee considered that at present these proportions were reasonable.

ROLE AND POLICY OF THE RUBBER FUND BOARD

Finally it should be clearly recognised that the Malayan Rubber Fund Board, with its heavy representation of the rubber producers of the Federation, has a most important role to play in guiding research and development along lines which are of vital interest to the rubber-producing industry of the Federation. The Board's policy must largely follow that accepted by Government and the industry before the enactment of the Malayan Rubber Fund (Research & Development) Ordinance 1958, which defined its objectives as twofold—namely the production of natural rubber at reduced cost, and the retention and improvement of quality in the product presented for sale in the overseas market.

Eradication of Bamboo

A recent experiment carried out in co-operation with the Forest Research Institute has shown that the giant bamboo, *Gigantochloa levis* can be effectively controlled by a number of herbicides. Sodium arsenite applied at concentrations of up to 7½% w/w was ineffective but sodium chlorate at 20% and 40%, Lallicide at 10% and 15%, dalapon at 5% and 7½%, and aminotriazole at 2½%, 5% and 10% concentrations, all had drastic effects on the bamboo, with the higher concentrations giving complete kill in all cases. Lallicide at 10% concentration might prove to be the cheapest treatment for use in the field. All the above chemicals were sprayed at 4 pints per clump on the bottom three feet of stem, and could be expected to have similar effects on other types of bamboo.

Some of the bamboo clumps in this experiment were slashed before spray treatments were applied. The treatments gave effective control, but as treatments applied to the standing stem were so effective there is no advantage in carrying out preliminary slashing before treatments in the field.

2,4,5-T painted on to the cut and uncut bamboo stems, had little effect on growth in this experiment.

Elongated Leaves

Abnormally elongated leaflets, with wavy margins, have been encountered many times in young rubber. Finding them to be unassociated with pest or disease attack, we suspected the condition to have arisen from a temporary shortage of a mineral element. In *Maladies of Hevea*, where a typical leaf is illustrated on page 93, it is stated that the malformation will not reappear in the new shoots. Usually all the leaves in one whorl are affected, earlier and later whorls being normal, or showing a progressive trend from and to normality. An exception to the rule was discovered on an estate in Pahang, where a Tjir 1 clonal seedling planted as a stump in 1956 has persistently formed elongated leaves. The Manager, who has had the tree under observation for four and a half years, has very kindly obtained photographs for us. Being slow growing, it has been over-shadowed by its normal neighbours, which are already of tappable size.

Figure 1. The tree with elongated leaves is held by the mandore.

Photo E.F. Lodge

Figure 2. One of the trees of the abnormal clone, 18 months from budding, now 8 feet in height.

Budwood of the abnormal seedling was sent to our Experiment Station, where it was budded on

to unselected seedling stocks. All the buddings, now 18 months old, have exhibited the same malformation. The permanence of the condition, in the original plant and its buddings, suggests that it is genetically determined by either a rare combination of genes, or a mutation.

It is perhaps more than a coincidence that seven cases of elongated leaves where the planting material is recorded on our files have all involved Tjir 1 clonal seedlings. We would be interested to know if similar cases are encountered on other planting material.

R. R. I. News

Mr Tan Beng Lin A. A. S. A. joined the staff of the Institute Secretariat in March 1961 as Accountant. He was previously employed by the Malacca Municipality from 1953 with a break of three years when he attended the Royal Melbourne Technical College, Australia and passed the examinations of the Australian Society of Accountants. He resumed duty with the Malacca Municipality in February 1958 as Municipal Accountant and resigned in order to take up his appointment with the Institute.

Mr Tan Beng Lin replaces Mr S.T. Sanbanther who retired in June, 1961, after serving at the Institute for thirty-two years.

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Mr Chin Peng Sung, B.Sc., joined the Staff of the Chemical Division as Research Officer Division B on 8 March, 1961. He was awarded a scholarship by the R.R.I.M. in 1957 and studied at the University of Malaya in Singapore, where he obtained his Bachelor of Science degree in 1960 and his Bachelor of Science (Honours) degree in Chemistry in 1961. Mr Chin Peng Sung is at present working in the Colloids Section of the Division, where he is investigating particulate bodies in fresh latex, using light optical microscopy.

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Dr E.K. Ng joined the staff of the Botanical Division as Plant Physiologist at the end of March.

Dr Ng, who is a Federal citizen, obtained his B.Sc. in Botany at the University of Melbourne, Australia. He then did postgraduate studies both at Melbourne and Bedford College, University of London, where he received his M.Sc. and Ph.D respectively.

Dr Ng's work at the Institute will be concerned largely with laboratory investigations of the role of natural growth regulators in the physiology of *Hevea*.

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Mr Ramaswamy Narayanan, M.Sc., joined the staff of the Statistics Division as Assistant Statistician on 15 June 1961. He obtained his Master of Science degree in Statistics at Kerala University in 1952 and subsequently lectured for two years on Statistics and Mathematics in Vijay College, Bijapur, Bombay State. Thereafter he served as Research Assistant for nearly six years in the Statistical Department of the Central Water and Power Research Station, Poona, doing research on the application of modern statistical methods to engineering problems. He will assist the Statistics Division in the design and analysis of experiments and in the study of other statistical problems of interest to the Institute.

R.R.I.M. Planters' Conference 1961
28th and 29th July

The demand for places at the forthcoming Planters' Conference has exceeded all expectations and we regret that no further applications can be considered. The number of places at the Conference is limited and some applications have therefore, much to our regret, been unsuccessful. All applicants have now been informed whether places are available for them or not.

Proceedings of the Natural Rubber Research Conference, Kuala Lumpur, 1960

The *Proceedings* of this Conference, which took place in September/October 1960, are available as a single bound volume containing over 1,000 pages. All technical papers and discussions are reported in full. The price is $23.00 (Malayan) plus cost of postage and packing as follows: $1 within Malaya; $2 (book post) or $5 (parcel post), outside Malaya.

OUR COVER PHOTOGRAPH SHOWS POLLARDING OF RRIM 501 AT THE R.R.I. EXPERIMENT STATION.

Photo B.R.B.

The Standard Engravers & Art Printers, 63 Campbell Road, Kuala Lumpur, Selangor